We claim:

1. An integrated wavelength router comprising

a demultiplexer arranged to couple individual wavelengths in an input optical WDM signal to N respective demultiplexer outputs,

a binary tree including at least first and second stages of interconnected 1 × 2 switches, each of the switches in said first stage arranged to couple one of said N outputs of said demultiplexer to inputs of at least two switches in said second stage, and

a plurality of K multiplexers arranged to combine the outputs from a plurality of switches in said second stage to form K outputs of said router.

2. The invention defined in claim 1 wherein the outputs of each switch are waveguides crossing each other to form inputs to the switches in the next stage.

3. The apparatus of claim 1 wherein said demultiplexer, said binary tree, and said multiplexers are all formed in a planar arrangement on one or more substrates.

4. The apparatus of claim 3 wherein the demultiplexer and said multiplexers are waveguide grating routers.

5. The apparatus of claim 3 wherein said switches are Mach-Zehnder interferometers.

6. The apparatus of claim 5 wherein said switches are activated thermooptically.

7. The apparatus of claim 1 in which the outputs of said multiplexers are connected to an N x N waveguide grating router.

8. The invention defined in claim 1 further including a plurality of shutters disposed before the inputs of said multiplexers.

9. An integrated wavelength router comprising

a binary tree comprising at least first and second stages of interconnected 1 × 2 switches,

a demultiplexer arranged to couple N individual wavelengths in a WDM optical signal to inputs of respective switches in said first stage, and

a plurality of K multiplexers arranged to combine outputs from a plurality of switches in said second stage to form outputs of said router.

10. A router comprising

a binary tree containing $\log_2 K$ stages of interconnected 1×2 switches,

a demultiplexer arranged to receive an input WDM signal containing N wavelengths, and apply N separated wavelengths to inputs of switches in a first of said $\log_2 K$ switch stages, and

K multiplexers arranged to combine outputs from switches in the last of said $\log_2 K$ switch stages to form K outputs of said router.

11. The router of claim 10 wherein said switches are integrated in a planar arrangement on one or more silica substrates, and wherein the outputs of the switches in each of said stages cross each other before being connected to inputs of the switches in the next stage.

12. The router of claim 10 further including a plurality of shutters interposed in the paths leading to the inputs of said multiplexers.

13. The invention defined in claim 10 wherein the outputs of each switch are waveguides crossing each other to form inputs to the switches in the next stage.

14. The apparatus of claim 10 wherein said demultiplexer, said switches and said multiplexers are all formed in a planar arrangement on one or more substrates.

15. The apparatus of claim 14 wherein the demultiplexer and said multiplexers are waveguide grating routers.

16. The apparatus of claim 14 wherein said switches are Mach-Zehnder interferometers.

17. The apparatus of claim 16 wherein said switches are activated thermooptically.

18. The apparatus of claim 10 in which the outputs of said multiplexers are connected to an N x N waveguide grating router.